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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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MATRIX SEMICONDUCTOR, INC.
3230 SCOTT BOULEVARD
SANTA CLARA, CA 95054

EXAMINER	
RUGGLES, JOHN S	
ART UNIT	**PAPER NUMBER**
1756	

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/815,312	CHEN, YUNG-TIN	
	Examiner	Art Unit	
	John Ruggles	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/28/05 & 4/1/04*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-69* is/are pending in the application.

4a) Of the above claim(s) *43-69* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-42* is/are rejected.

7)☒ Claim(s) *1-42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/28/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-42, drawn to phase shifting photomasks or masks (PSMs, apparatus), classified in class 430, subclass 5.

II. Claims 43-66, drawn to methods for patterning features on a wafer surface by singly exposing a single photoresist layer through a PSM, developing the photoresist, and optional etching of the wafer surface through the patterned photoresist (processes), classified in class 430, subclasses 311 and 313.

III. Claims 67-69, drawn to a monolithic three dimensional memory array having patterned features (product), classified in class 257, subclass 528.

Inventions II and I are related as processes and apparatus for their practice. The inventions are distinct if it can be shown that either: (1) the processes as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed in Group I can be used to practice another and materially different process than those claimed in Group II, such as exposing plural photoresist layers on a non-wafer optical surface by using the apparatus of Group I with intermediate developing and alignment, followed by further developing and optional coating of the non-wafer optical surface through the two photoresist patterns, without any step of etching.

Inventions II and III are related as processes of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the processes as

claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product monolithic three dimensional memory array having patterned features as claimed in Group III can be made by another and materially different process than those of Group II, such as exposing and developing plural photoresist layers on a suitable surface through a PSM along with intermediate alignment of the PSM and etching of the suitable surface.

Inventions I and III are related as apparatus and product made. The inventions in this relationship are distinct if either or both of the following can be shown: (1) that the apparatus as claimed is not an obvious apparatus for making the product and the apparatus can be used for making a materially different product or (2) that the product as claimed can be made by another and materially different apparatus (MPEP § 806.05(g)). In this case, the apparatus as claimed in Group I is not an obvious apparatus for making the product of Group III and the apparatus of Group I can be used for making a materially different product than that of Group III, such as a non-monolithic three dimensional optical product that does not have any memory feature or structure and is assembled from plural separable components patterned by the apparatus of Group I.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and also because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Pamela Squyres on 1/26/06, a provisional election was made **without** traverse to prosecute the invention of Group I, claims 1-42. Affirmation of this election must be made by Applicant in replying to this Office action. Claims 43-69 are

withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to non-elected inventions.

Drawings

At least Figures 1a-1c, Figures 2a-2c, and Figure 16b should all be designated by a legend such as --Prior Art-- because only that which is old is illustrated, since Figures 1a and 2a are both disclosed to be "conventional" photomasks in paragraphs [0018] and [0021], respectively, Figures 1b-1c and 2b-2c correspond to Figures 1a and 2a as described in [0019-0020] and [0022-0023], respectively, and Figure 16b is described to be an example of prior art in [0090]. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are also objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: the Figure "9a" referenced in the specification at [0033-0035] was not found in the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If

the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: (1) in each of paragraphs [0033-0035], references to non-existent Figure "9a" must be corrected to existing figure number(s), such as Figure --[[9a]] 10a--, if this best represents the intended figure number; (2) in [0038] line 2, "different exposure dose" should be corrected to --different exposure doses--; and (3) in [0061] line 4, "Fig. 9" should be clarified (to e.g., --Fig. 9 of this application--, etc.), in order not to be confused with Fig. 9 of the Chen et al. prior art US Patent 6,482,555 discussed in this passage. Note that due to the number of errors, those listed here are merely *examples* of the corrections needed and do *not* represent an exhaustive list thereof.

Appropriate correction is required. An amendment filed making all appropriate corrections must be accompanied by a statement that the amendment contains no new matter and also by a brief description specifically pointing out which portion of the original specification provides support for each of these corrections.

Claim Objections

Claims 1-42 are objected to because of the following informalities: (1) in claim 1 lines 3 and 7-8, "each transmitting window" should be changed to --each of the plurality of transmitting nonprinting windows--, at both occurrences, in order to better correspond with the language found in line 2 of claim 1; (2) similar changes should also be made at least in claims 3-7, 10-14, 16, 18-20, 22-25, 28, 32, and 34, ***as well as throughout the rest of the claims*** as needed, to improve consistency; and (3) in claim 33 line 1, --transmitting-- has been misspelled. Claims 2-15 depend on claim 1, claims 17-24 and 38 depend on claim 16, claims 26-33 depend on claim 25, and claims 35-37 and 39-42 depend on claim 34. Appropriate correction is required.

Claims 9-15 are also objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In particular, claim 9 is improperly dependent on claim 3, because the first and second phase assignments were previously recited in claim 2, on which claim 3 depends, to be the reverse of those recited in claim 9. Claims 10-15 depend on claim 9. However, for the purpose of this Office action and in order to advance the prosecution of this application, claim 9 has been interpreted to depend on claim 1, instead of on claim 3.

Applicant is further advised that should claims 16-18 and 21-22 be found allowable, claims 34-36 and 39-40, respectively, will each be objected to under 37 CFR 1.75, as being a substantial duplicate of a previous claim; and claims 35-37 and 39-42 will also be objected to due to their dependence either directly or indirectly on claim 34 and any intervening claims. When two claims in an application are duplicates or else are so close in content that they both

cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-24 and 34-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 16 lines 7-8, the phrase "the transmitting area is printing on all sides of the transmitting window" is not entirely clear. Even though it is believed that "the transmitting window" in this phrase derives antecedent basis from the "transmitting **nonprinting** window" (emphasis added) recited earlier in line 2 of claim 16, the recitation for "printing on ***all*** sides of the transmitting window" (emphasis added) could be misunderstood to suggest that transmitting areas on ***all*** sides (both outside and inside) of the transmitting **nonprinting** window would become transmitting ***printing*** window areas. However, for the purpose of this Office action and in order to advance the prosecution of this application, this phrase in claim 16 lines 7-8 has been interpreted to mean --the transmitting area is printing on all sides [[of]] surrounding the transmitting nonprinting window--, in accordance with similar language recited in claim 1 lines 7-8 and claim 25 lines 5-6. Claims 17-24 and 38 depend on claim 16.

Similarly, in claim 34 lines 5-6, the phrase "the second transmitting area is printing on all sides of the transmitting window" is also not entirely clear, but for the purpose of this Office

action and in order to advance the prosecution of this application, this phrase has been interpreted to mean --the second transmitting area is printing on all sides [[of]] surrounding the transmitting nonprinting window--. Claims 35-37 and 39-42 depend on claim 34.

Also, claim 38 lacks proper antecedent basis for "the second transmitting area", because this claim depends on claim 22, rather than on claim 34. However, for the purpose of this Office action and in order to advance the prosecution of this application, claim 38 has been interpreted to depend on claim 34, instead of on claim 22.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Rosenbluth et al. (2002/0140920).

Rosenbluth et al. teach a system and a method for lithographically printing semiconductor patterns using a phase shifting mask (PSM) that is optimized to define dark or nonprinting areas of high quality images, even when the desired printed patterns have critical dimensions (CDs) that approach the resolution limit of the lithographic system (title, abstract). Figure 10 shows a chromeless PSM with a selectively etched substrate to form 0° phase areas 1010 and 180° phase areas 1020 (paragraph [0126], so that the PSM substrate has a plurality of

first phase transmitting windows that are either recessed or raised up with respect to the surrounding transmitting area of a second phase that is opposite to the first phase). Figure 16 shows a similar optimized chromeless PSM having 0° phase areas 1610 and 180° phase areas 1620 (e.g., for off-axis illumination, etc. [0130]). Figure 14 shows a desired array pattern of capacitor contacts (for a DRAM) having a CD width 1401 of 110nm and a horizontal pitch or period of 220nm for λ = 193 nm and NA = 0.6 [0129]. Figure 17 shows a chromeless PSM pattern having a plurality of rectangular transmitting windows at a first phase surrounded by a transmitting area at a second phase opposite from the first phase so that the rectangular transmitting windows are uniformly spaced in a square grid array (e.g., at a pitch on the PSM of about 660nm (which is 2.05λ/NA for λ = 193 nm and NA = 0.6), etc.) to produce dark or nonprinting features by destructive interference in the overall (resist) image between light from the rectangular transmitting (nonprinting) windows at a first phase and light from the surrounding (printing) transmitting area at a second phase that is opposite to the first phase, in order to produce superior resolution in the overall resist image ([0139], reading on instant claims 1-2, 5-7, 9, 12-14, 16-17, 21, 34-35, 38-39, and 42). For a desired image array of dark features having a CD of 110nm at a pitch of 220nm shown in Figure 14 to be made using the chromeless PSM having an array of uniformly spaced rectangular transmitting (nonprinting) windows at a pitch of about 660nm shown in Figure 17, the scaling factor (S) between the size of dimensions in the desired overall resist image and those of the corresponding chromeless PSM pattern would be $S \approx 3$. Thus, the shortest dimension (D_1) of the rectangular transmitting nonprinting window(s) parallel to the plane of the chromeless PSM would be $D_1 \approx$ 110nm x S (which reads on: the $D_1 \leq$ about 160nm x S of instant claims 3, 10, 18, 22, 28, 32, 36, and 40; and the $D_1 \leq$

about 120nm x S of instant claims 4, 11, 19, 23, 37, and 41). Likewise, the first width (D_2) of unbroken clear transmitting area or spacing between adjacent transmitting nonprinting windows would be $D_2 \approx$ 110nm x S (which reads on: the $D_2 \geq$ 100nm x S of instant claims 8, 15, 20, and 24). Also, the width (D_1), the spacing (D_2), and the separation distance dimension (D_3) of adjacent transmitting nonprinting windows would be described by $D_1 \approx D_2 \approx D_3 \approx$ 110nm x S (which reads on: the $D_1 \leq$ about 160% D_2 of instant claims 25-26, 29-30, and 33; the $D_3 \geq$ about 100nm x S of instant claims 27 and 31; and the requirement for $D_1 \leq$ about 160% D_2, $D_3 \geq$ about 100nm x S, and $D_1 <$ about 160nm x S of instant claim 32).

Claims 1-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Nyhus et al. (2004/0101764).

Nyhus et al. teach a chromeless phase shift lithography (CPL) mask or chromeless phase shift mask (PSM) and a method for patterning contacts with this chromeless PSM (title, abstract). A chromeless PSM can provide significantly better aerial image contrast when compared to binary masks; but unlike an alternating PSM, a chromeless PSM allows single exposure with a single mask that avoids many of the dual mask concerns such as throughput, mask layout, and mask-to-mask overlay [0002]. Figures 7A, 7B, 8A, and 8B show chromeless PSMs having patterned arrays of recessed rectangular areas (transmitting windows 702 in Figures 7A and 7B) or raised rectangular areas (transmitting windows 802 in Figures 8A and 8B) formed by selectively etching the PSM substrate to result in rectangular transmitting windows that transmit light at a first phase that is opposite (having a 180° phase difference) from the second phase of the surrounding transmitting area (704 in Figures 7A and 7B or 804 in Figures 8A and 8B) [0031-0032], which are very similar in structure to the chromeless PSMs shown by instant

Figures 10a, 10b, 15, and 16. The resulting negative resist pattern in Figure 12 clearly shows that the recessed or raised transmitting window regions of the chromeless PSM are darkened by their sufficiently small size (having sub-resolution dimensions [0044]). Off-axis illumination dramatically improves image contrast for imaging 100nm contact patterns at a pitch of 200nm in a two-dimensional (2D) square grid array of contacts patterned in the resist [0039] (which means the minimum printed area spacing surrounding each contact would be 100nm wide). Figure 5B shows aerial image intensity for a single 0.11μm (110nm) contact pattern made by quadrupole imaging of a resist through a chromeless PSM compared to that for an aerial image intensity from a single binary mask pattern under the same illumination conditions (which suggests the usefulness of a chromeless PSM having a recessed or raised transmitting window feature pattern similar to that described above, but with larger transmitting window dimensions for making 110nm contacts, presumably spaced apart by a correspondingly larger distance of 110nm for a 220nm pitch). The scaling factor (S) between dimension sizes in the desired overall resist image and those of the corresponding chromeless PSM pattern is not specifically identified. However, the shortest dimension (D_1) of the rectangular transmitting nonprinting window(s) parallel to the plane of the chromeless PSM would be $D_1 \approx$ (100-110nm) x S (which reads on: the $D_1 \leq$ about 160nm x S of instant claims 3, 10, 18, 22, 28, 32, 36, and 40; and the $D_1 \leq$ about 120nm x S of instant claims 4, 11, 19, 23, 37, and 41). Likewise, the first width (D_2) of unbroken clear transmitting area or spacing between adjacent transmitting nonprinting windows would be $D_2 \approx$ (100-110nm) x S (which reads on: the $D_2 \geq$ 100nm x S of instant claims 8, 15, 20, and 24). Also, the width (D_1), the spacing (D_2), and the separation distance dimension (D_3) of adjacent transmitting nonprinting windows would be described by $D_1 \approx D_2 \approx D_3 \approx$ (100-110nm) x S

(which reads on: the $D_1 \leq$ about 160% D_2 of instant claims 25-26, 29-30, and 33; the $D_3 \geq$ about 100nm x S of instant claims 27 and 31; and the requirement for $D_1 \leq$ about 160% D_2, $D_3 \geq$ about 100nm x S, and $D_1 <$ about 160nm x S of instant claim 32).

Claims 1-2, 5-8, 16, 21, 24-25, 30-31, 33-34, 38-39, and 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Zimlich et al. (6,461,774).

Zimlich et al. teach a phase shift mask (PSM), a method of making the PSM, and a method of using the PSM for patterning to form field emission display emitters. The PSM pattern is sized to expose a photoresist or resist in just a single exposure to avoid the disadvantages associated with conventional dual-pass PS lithography (abstract). Figures 1-2 show the PSM 10 as a chromeless PSM having rectangular (square) PS recessed transmitting windows 18 etched into the PSM substrate 12 (col. 3 line 31 to col. 4 line 37). Figure 3 shows the resulting image intensity through the recessed windows to be nonprinting relative to that from the surrounding transmitting area, which prints on an imaged resist (reading on instant claims 1-2, 5-7, 16, 21, 34, 38-39, and 42). The size of the recessed transmitting nonprinting windows is about 1-2μm (1,000-2,000nm, col. 4 lines 38-63). A 2x reduction stepper (having a scaling factor (S) of 2) can be used with the chromeless PSM to form an overall resist pattern etching mask made from unexposed islands of resist having linear dimensions of about 1μm ($D_1 \approx$ 1,000nm x S) with a separation distance (first width (D_2) of unbroken clear transmitting area or first dimension (D_3) spacing between adjacent transmitting nonprinting windows) between neighboring island regions of about 2-4μm ($D_2 \approx D_3 \approx$ 2,000-4,000nm, col. 5 line 28 to col. 6 line 6, which reads on: the $D_2 \geq$ 100nm x S of instant claims 8 and 24; the $D_1 \leq$ about 160% D_2 of instant claims 25, 30, and 33; and the $D_3 \geq$ about 100nm x S of instant claims 24 and 31).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-42 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 8, and 12-17 of copending Application No. 10/728,436 (Chen '436, corresponding to 2005/0123837) in view of either Rosenbluth et al. (2002/0140920) or Nyhus et al. (2004/0101764). While teaching many similar features to those of the instant claims, the phase shift mask (PSM) recited by Chen '436 includes light blocking or opaque (e.g., chrome (Cr), etc.) material between the transmitting nonprinting window(s) and the surrounding transmitting printing area on the PSM. However, either Rosenbluth et al. or Nyhus et al., as discussed above, demonstrate that closely spaced features on a PSM (such as an array of rectangular transmitting nonprinting windows surrounded by a transmitting area that prints on a resist for forming a pattern of contacts) are advantageously formed on a chromeless PSM having very similar features to those of Chen '436, but without any light blocking or opaque (e.g., Cr,

etc.) material between the transmitting nonprinting window(s) and the surrounding transmitting area that prints on an exposed resist. Other instantly claimed chromeless PSM aspects that are not recited by Chen '436 are taught by either Rosenbluth et al. or Nyhus et al., as discussed above.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the PSM taught by Chen '436 into a chromeless PSM: (1) that is optimized to define dark or nonprinting areas of high quality images, even when the desired printed patterns have critical dimensions (CDs) that approach the resolution limit of the lithographic system (as taught by Rosenbluth et al.) or (2) that provides significantly better aerial image contrast when compared to binary masks and because a chromeless PSM, unlike an alternating PSM, allows single exposure with a single mask that avoids many of the dual mask concerns such as throughput, mask layout, and mask-to-mask overlay (as taught by Nyhus et al.).

This is a provisional obviousness-type double patenting rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John Ruggles
Examiner
Art Unit 1756

S. ROSASCO
PRIMARY EXAMINER
GROUP 1500